

DRAFT
Engineering Evaluation
Leisure Home Mobile Home
Application No. 23788
Plant No. 20958

2185 Occidental Road, Santa Rosa, CA 95401

BACKGROUND

Leisure Home Mobile Home has applied for an Authority to Construct (AC) for the following equipments:

**S-1 Emergency Standby Natural Gas/LPG Fueled Generator Set,
 General Motors, Model: Vortec 5.0L, Year 2010
 89 BHP, 0.763 MMBtu/hr**

A-1 Catalytic Reduction, Mine-X, Model DC45, 300cpsi

The natural gas powered emergency standby generator set (S-1) will provide emergency standby power in the event of a disruption to power service. The engine is equipped with an air fuel ratio controller and a Catalytic Converter to reduce exhaust emissions of nitrogen oxides (NO_x), precursor organic compound (POC) and carbon monoxide (CO). These criteria pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

EMISSIONS CALCULATIONS

Basis for S-1

89 hp output rating

50 hr/yr operation for testing and maintenance

744 SCF/hr max fuel use rate

The emission factors used to estimate criteria pollutant emissions from the engine generator set described above are based on engine manufacturer abated emissions data. Total Hydrocarbon emission rates were assumed to be equal to Precursor Organic Compound (POC) emission rates. PM₁₀ and SO₂ emission factors are from AP-42 factors. The engine will operate during emergency use and for a maximum of 50 hours per year for maintenance and testing. See Table 1.

Table 1

Pollutant	Abated Emission Factor (g/BHP-hr)	Abated Emission (lb/day)	Abated Emission (lb/yr)	Abated Emission (TPY)	Maximum Daily Emission (lb/day)
NO _x	1.50	0.29	14.72	0.007	7.06
POC	1.50	0.29	14.72	0.007	7.06
CO	2.00	0.39	19.62	0.010	9.42
PM	0.04	0.01	0.36	0.000	0.17
SO ₂	2.29E-03	0.00	0.02	0.000	0.01

TOXIC RISK SCREENING ANALYSIS

The emission factors used to estimate Hazardous Air Pollutants (HAPs) emissions from the engine described above are from: AP-42 for natural gas fired 6-cycle rich burn engine Table 3.2-3, or the California Air Toxics Emission Factor Database (maintained by the California Air Resources Board). The CATEF Emission Factors maintained by the ARB were used to estimate emissions for all compounds that have AP-42 emission factors and CATEF emission factors.

The HAP emission estimates are based on uncontrolled emission factors for natural gas engines. Since there is abatement device associated with this application, 50% reduction in organic compounds will be assumed.

As shown in Table 2 and Table 3 below, no toxic air contaminants exceed the District Risk Screening Triggers and a Risk Screening Analysis is not required.

Table 2
HAP EMISSIONS ESTIMATES BASED ON AP-42 TABLE 3.2-3 (FOR COMPOUNDS WITH NO CATEF E.F.)

Compound		E.F.	Unit	Assumed Abatement Efficiency %	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)
1,1,2,2-Tetrachloroethane		2.53E-05	lb/MMBtu	50	9.65E-06	None	NO	4.82E-04	1.90E+00	NO
1,1,2-Trichloroethane	<	1.53E-05	lb/MMBtu	50	5.83E-06	None	NO	2.92E-04	6.60E+00	NO
1,1-Dichloroethane	<	1.13E-05	lb/MMBtu	50	4.31E-06	None	NO	2.15E-04	6.60E+01	NO
1,2-Dichloroethane	<	1.13E-05	lb/MMBtu	50	4.31E-06	None	NO	2.15E-04	None	NO
1,2-Dichloropropane	<	1.30E-05	lb/MMBtu	50	4.96E-06	None	NO	2.48E-04	None	NO
1,3-Butadiene		6.63E-04	lb/MMBtu	50	CATEF	None	NO	CATEF	1.10E+00	NO
1,3-Dichloropropene	<	1.27E-05	lb/MMBtu	50	4.84E-06	None	NO	2.42E-04	None	NO
Acetaldehyde		2.79E-03	lb/MMBtu	50	CATEF	1.00E+00	NO	CATEF	3.80E+01	NO
Acrolein		2.63E-03	lb/MMBtu	50	CATEF	5.5E-03	NO	CATEF	1.40E+01	NO
Benzene		1.58E-03	lb/MMBtu	50	CATEF	2.9E+00	NO	CATEF	3.80E+00	NO
Butyr/isobutyraldehyde		4.86E-05	lb/MMBtu	50	1.85E-05	None	NO	9.27E-04	None	NO
Carbon Tetrachloride	<	1.77E-05	lb/MMBtu	50	6.75E-06	4.2E+00	NO	3.37E-04	2.50E+00	NO
Chlorobenzene	<	1.29E-05	lb/MMBtu	50	4.92E-06	None	NO	2.46E-04	3.90E+04	NO
Chloroform	<	1.37E-05	lb/MMBtu	50	5.22E-06	3.3E-01	NO	2.61E-04	2.00E+01	NO
Ethylbenzene	<	2.48E-05	lb/MMBtu	50	CATEF	None	NO	CATEF	4.30E+01	NO
Ethylene Dibromide	<	2.13E-05	lb/MMBtu	50	8.12E-06	None	NO	4.06E-04	1.50E+00	NO
Formaldehyde		2.05E-02	lb/MMBtu	50	CATEF	1.2E-01	NO	CATEF	1.80E+01	NO
Methanol		3.06E-03	lb/MMBtu	50	1.17E-03	6.2E+01	NO	5.83E-02	1.50E+05	NO
Methylene Chloride		4.12E-05	lb/MMBtu	50	1.57E-05	3.1E+01	NO	7.85E-04	1.10E+02	NO
Naphthalene	<	9.71E-05	lb/MMBtu	50	CATEF	None	NO	CATEF	3.20E+00	NO
PAH		1.41E-04	lb/MMBtu	50	CATEF	None	NO	CATEF	6.90E-03	NO
Styrene	<	1.19E-05	lb/MMBtu	50	4.54E-06	4.6E+01	NO	2.27E-04	3.50E+04	NO
Toluene		5.58E-04	lb/MMBtu	50	2.13E-04	8.2E+01	NO	1.06E-02	1.20E+04	NO
Vinyl Chloride	<	7.18E-06	lb/MMBtu	50	2.74E-06	4.0E+02	NO	1.37E-04	1.40E+00	NO
Xylene		1.95E-04	lb/MMBtu	50	7.44E-05	4.9E+01	NO	3.72E-03	2.70E+04	NO

Table 3
HAP EMISSION ESTIMATES BASED ON CATEF EMISSION FACTORS

SUBSTANCE	E.F. MEAN	UNIT	Assumed Abatement Efficiency %	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)
1,3-Butadiene	2.08E-01	lbs/MMcf	50	7.74E-05	None	NO	3.87E-03	6.30E-01	NO
Acenaphthene	3.88E-03	lbs/MMcf	50	1.44E-06	None	NO	7.22E-05	None	NO
Acenaphthylene	2.90E-02	lbs/MMcf	50	1.08E-05	None	NO	5.39E-04	None	NO
Acetaldehyde	1.77E+00	lbs/MMcf	50	6.57E-04	None	NO	3.28E-02	3.80E+01	NO

Acrolein	1.09E+00	lbs/MMcf	50	4.07E-04	5.50E-03	NO	2.03E-02	1.40E+01	NO
Anthracene	3.68E-03	lbs/MMcf	50	1.37E-06	None	NO	6.84E-05	None	NO
Benzene	3.82E+00	lbs/MMcf	50	1.42E-03	2.90E+00	NO	7.11E-02	3.80E+00	NO
Benzo(a)anthracene	5.88E-04	lbs/MMcf	50	2.19E-07	None	NO	1.09E-05	None	NO
Benzo(a)pyrene	2.30E-04	lbs/MMcf	50	8.56E-08	None	NO	4.28E-06	None	NO
Benzo(b)fluoranthene	3.74E-04	lbs/MMcf	50	1.39E-07	None	NO	6.96E-06	None	NO
Benzo(g,h,i)perylene	3.90E-04	lbs/MMcf	50	1.45E-07	None	NO	7.25E-06	None	NO
Benzo(k)fluoranthene	2.06E-04	lbs/MMcf	50	7.66E-08	None	NO	3.83E-06	None	NO
Chrysene	6.20E-04	lbs/MMcf	50	2.31E-07	None	NO	1.15E-05	None	NO
Dibenz(a,h)anthracene	2.50E-05	lbs/MMcf	50	9.30E-09	None	NO	4.65E-07	None	NO
Ethylbenzene	2.32E-02	lbs/MMcf	50	8.63E-06	None	NO	4.32E-04	4.30E+01	NO
Fluoranthene	1.99E-03	lbs/MMcf	50	7.40E-07	None	NO	3.70E-05	None	NO
Fluorene	1.38E-02	lbs/MMcf	50	5.14E-06	None	NO	2.57E-04	None	NO
Formaldehyde	3.70E+00	lbs/MMcf	50	1.38E-03	2.1E-01	NO	6.88E-02	1.80E+01	NO
Indeno(1,2,3-cd)pyrene	3.38E-04	lbs/MMcf	50	1.26E-07	None	NO	6.29E-06	None	NO
Naphthalene	1.45E-01	lbs/MMcf	50	5.41E-05	None	NO	2.70E-03	3.20E+00	NO
Phenanthrene	1.41E-02	lbs/MMcf	50	5.26E-06	None	NO	2.63E-04	None	NO
Propylene	3.20E+01	lbs/MMcf	50	1.19E-02	None	NO	5.95E-01	1.20E+05	NO
Pyrene	3.58E-03	lbs/MMcf	50	1.33E-06	None	NO	6.66E-05	None	NO
Toluene	2.14E+00	lbs/MMcf	50	7.96E-04	8.2E+01	NO	3.98E-02	1.20E+04	NO
Xylene (m,p)	8.82E-01	lbs/MMcf	50	3.28E-04	4.9E+01	NO	1.64E-02	2.70E+04	NO
Xylene (o)	4.34E-01	lbs/MMcf	50	1.61E-04	4.9E+01	NO	8.07E-03	2.70E+04	NO
Xylene (Total)	1.20E-01	lbs/MMcf	50	4.48E-05	4.9E+01	NO	2.24E-03	2.70E+04	NO
PAH Equivalents as Benzo(a)pyrene	7.68E-06	lbs/MMcf	50	2.86E-09	None	NO	1.43E-07	6.90E-03	NO

PLANT CUMULATIVE EMISSIONS

Plant cumulative increase analysis is required for all new or modified sources. Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant 20958 from the operation of S-1.

Table 4

Plant Cumulative Increase: (tons/year)			
Pollutant	Existing	New	Total
NO _x	0.000	0.007	0.007
POC	0.000	0.007	0.007
CO	0.000	0.010	0.010
PM ₁₀	0.000	0.000	0.000
SO ₂	0.000	0.000	0.000

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO_x, CO, SO₂ or PM₁₀.

Based on the emission calculations above, BACT is not triggered.

OFFSETS

Per Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

STATEMENT OF COMPLIANCE

The owner/operator of S-1 shall comply with Regulation 6 (*Particulate Matter and Visible Emissions Standards*) and Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). From Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-1 is an emergency standby generator; from Regulation 9, Rule 8 (*NOx and CO from Stationary Internal Combustion Engines*), Section 110.5 (*Emergency Standby Engines*), S-1 is exempt from the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waste Derived Fuel Gas*), 9-8-303 (*Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later*), 9-8-304 (*Emission Limits – Compression-Ignited Engines*), 9-8-305 (*Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later*), 9-8-501 (*Initial Demonstration of Compliance*) and 9-8-503 (*Quarterly Demonstration of Compliance*).

Allowable operating hours and the corresponding record keeping in Regulations 9-8-330 (*Emergency Standby Engines, Hours of Operation*) and 530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below.

The project is considered to be ministerial under the District's CEQA regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3)

This facility is located less than 1,000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412. A public notice was prepared and sent to all addresses within 1000 feet of the equipment and parents and guardians of students of the following school(s):

JX Wilson Elementary School
246 Brittain Lane
Santa Rosa, CA 95401

PSD, NSPS, and NESHAPS do not apply.

PERMIT CONDITIONS

COND# 23108 -----

1. The owner or operator shall operate the stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities(maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year. (Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)
2. The Owner/Operator shall equip the emergency standbyengine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage. (Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

3. The Owner/Operator shall not operate unless the natural gas fired engine is abated with a Catalytic Converter/Silencer Unit (Basis: Cumulative Increase)
4. Records: The Owner/Operator shall maintain the following monthly records in a District- approved log for at least 24 months from the date of entry. Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
 - a. Hours of operation (maintenance and testing).
 - b. Hours of operation for emission testing.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for engine.
 - f. CARB Certification Executive Order for the engine.(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

End of Conditions

RECOMMENDATION

Issue an Authority to Construct (AC) to **Leisure Home Mobile Home** for:

**S-1 Emergency Standby Natural Gas/LPG Fueled Generator Set,
 General Motors, Model: Vortec 5.0L, Year 2010
 89 BHP, 0.763 MMBtu/hr**

A-1 Catalytic Reduction, Mine-X, Model DC45, 300cps

By: _____
Douglas Hall
Supervising Air Quality Engineer
Date: March 26, 2012

DWH:YZL:yzl